4.13

Logarithmic Functions & Their Graphs

Name _____ **Date** _____ **Period** _____

Evaluate the logarithmic expression without using a calculator. Show work!

1. $\log_4 4$
2. $\log_6 1$
3. $\log_2 32$
4. $\log_3 81$
5. $\log_5 \sqrt[3]{25}$
6. $\log_6 \frac{1}{\sqrt[3]{36}}$
7. $\log 10^3$
8. $\log 10{,}000$
9. $\log 100{,}000$
10. $\log 10^{-4}$
11. $\log \sqrt[3]{10}$
12. $\log \frac{1}{\sqrt{1000}}$
13. $\ln e^3$
14. $\ln e^{-4}$
15. $\ln \frac{1}{e}$
16. $\ln 1$
17. $\ln \sqrt[4]{e}$
18. $\ln \frac{1}{\sqrt{e^7}}$

Evaluate the expression without using a calculator. (Use the basic properties.)

19. $7^{\log_7 3}$
20. $5^{\log_5 8}$
21. $10^{\log(0.5)}$
22. $10^{\log 14}$
23. $e^{\ln 6}$
24. $e^{\ln\left(\frac{1}{5}\right)}$

Use a calculator to evaluate the logarithmic expression if it is defined, and check your result by evaluating the corresponding exponential expression.

25. $\log 9.43$
26. $\log(-14)$
27. $\ln 4.05$
28. $\ln(-0.49)$

Solve the equation by changing it to exponential form.

29. $\log x = 2$

30. $\log x = -1$

31. $\log x = 4$

Match the function with its graph.

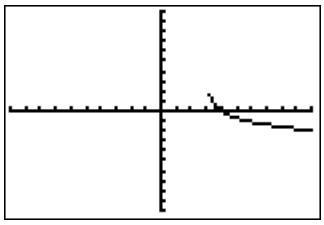
32. $f(x) = \log(1-x)$

33. $f(x) = \log(x+1)$

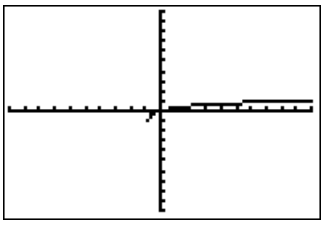
34. $f(x) = -\ln(x-3)$

35. $f(x) = -\ln(4-x)$

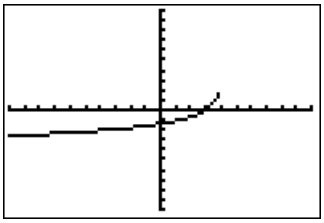
a)



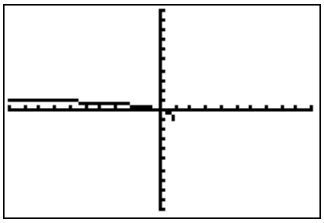
b)



c)

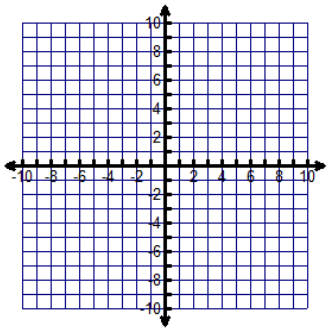


d)

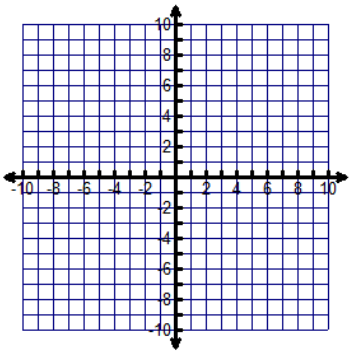


Describe the transformations that were used to change either the graph of $y = \log x$, *or* $y = \ln x$ into the given functions. Then graph the transformation without a calculator.

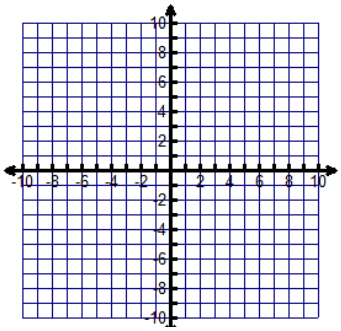
36. $f(x) = \ln(x+3)$



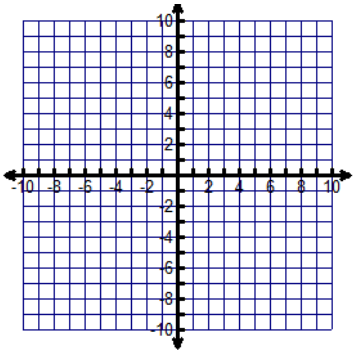
37. $f(x) = \ln(-x)+3$



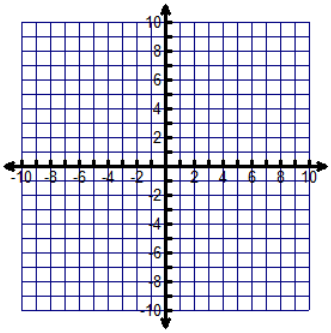
38. $f(x) = \ln(2-x)$



39. $f(x) = -1+\log(x)$



40. $f(x) = -2\log(-x)$



41. $f(x) = 2\log(3-x)-1$